

### ABSTRACT

A system and method for reducing harmonics in a circuit is disclosed. The system comprises a main rectifier,  $\left(\frac{n}{3}-1\right)$  auxiliary rectifiers connected to the main rectifier, and an autotransformer connected to both the main rectifier and the auxiliary rectifiers which provides  $2n$ -pulse rectification where  $n$  equals the number of phases of the system. The autotransformer generates  $\left(\frac{n}{3}-1\right)$  auxiliary voltage sets, each auxiliary voltage set having an auxiliary voltage amplitude,  $k$ , and an auxiliary voltage phase,  $\alpha$ , wherein  $k = \sqrt{4 + 2\sqrt{3}\cos\left(\theta - \frac{7\pi}{6}\right)}$  and wherein  $\alpha = \sin^{-1}\left(\frac{\sqrt{3}\sin\theta - 0.5}{k}\right)$  assuming a main voltage amplitude of one and a main voltage phase of ninety degrees, wherein  $\theta = \frac{180^\circ}{n}$  and its integral multiples for all possible real values of  $k$ . The main rectifier has a main rectifier power rating,  $P_{mdb}$  wherein  $P_{mdb} \geq \left(\frac{n+3}{2n}\right)$  times the load power, and the auxiliary rectifiers each have an auxiliary power rating,  $P_{auxdb}$ , wherein  $P_{auxdb} \leq \left(\frac{3}{2n}\right)$  times the load power.